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star has a paranax of 0.07 seconds of arc; still less can I conceive that he would find it more convenient to say that the distance is 0.029 *andromedæ*, or 2.8 *siriusweiten*, rather than 46 light-years.

C. The light-year is a unit of convenient size when compared with the dimensions of the known stellar universe. Known stellar distances range from about four light-years to five hundred light-years, with uncertainties in the higher values, for the distances of *individual* stars, of from fifty to one hundred per cent. Beyond five hundred light-years we enter the domain of speculations, which, while of great interest and value, are still but speculations, founded upon more or less probable assumptions as to the absorption of light in space, conditions of surface luminosity, etc. Whether the Milky Way is three thousand, or several million light-years across, the light-year is still a usable unit. Should the advance of our knowledge ever bring it to pass that a larger unit is needed, the logical step would appear to be a decimal multiple of the light-year, the light-century, or the light-millennium.

PLANETARY PHENOMENA FOR SEPTEMBER AND OCTOBER, 1913.

BY MALCOLM McNEILL.

PHASES OF THE MOON, PACIFIC TIME.

First Quarter...Sept. 7, 5 ^h 6 ^m A.M.	First Quarter ..Oct. 6, 5 ^h 46 ^m P.M.
Full Moon " 15, 4 46 A.M.	Full Moon ... " 14, 10 7 P.M.
Last Quarter .. " 23, 4 30 A.M.	Last Quarter . " 22, 2 53 P.M.
New Moon ... " 29, 8 57 P.M.	New Moon ... " 29, 6 29 A.M.

The fourth eclipse of the year, a total eclipse of the Moon, occurs on the night of September 14th-15th, the beginning visible generally in North American except the extreme northern portions, the Pacific Ocean, Australia, and eastern Asia; the ending visible generally in Alaska, the Pacific Ocean, except the eastern portions, Australia, and Asia.

CIRCUMSTANCES OF THE ECLIPSE, PACIFIC TIME.

Moon enters penumbra	September 15,	1 ^h 40 ^m A.M.
Moon enters shadow	"	15, 2 52 A.M.
Total eclipse begins	"	15, 4 1 A.M.
Middle of the eclipse	"	15, 4 48 A.M.
Total eclipse ends	"	15, 5 35 A.M.
Moon leaves shadow	"	15, 6 44 A.M.
Moon leaves penumbra	"	15, 7 56 A.M.

The fifth and last eclipse of the year, a partial eclipse of the Sun, will occur on September 29th. The region of visibility is confined to the southern hemisphere, and includes Madagascar and a part of South Africa. The maximum obscuration of the Sun is about 82 per cent of its diameter.

The autumnal equinox, when the Sun crosses the equator from north to south, occurs September 23d, about 8 A. M. Pacific time.

Mercury on September 1st is a morning star, rising a little more than an hour before sunrise, and may be seen in the early morning twilight under good weather conditions; but this condition lasts only a day or two, as the planet is rapidly approaching the Sun, and reaches superior conjunction, becoming an evening star on the morning of September 16th. It remains an evening star through the rest of the month and throughout October, reaching greatest east elongation on November 1st; but as the motion of the planet carries it to a position nearly 10° south of the Sun there is practically no possibility for naked-eye observations during October, the interval between the setting of the Sun and of the planet being less than one hour.

Venus remains a morning star, rising a little more than three hours before sunrise on September 1st, this interval diminishing to a little more than two hours by the end of October. During this period the planet moves 71° eastward and 21° southward from the western part of *Cancer*, not far from α and β *Geminorum*, through that constellation and *Leo* into *Virgo*. On the morning of October 25th there will be a very close conjunction with the first-magnitude star *Regulus*, α *Leonis*, at the time of nearest approach the planet being about half the Moon's apparent diameter north of the star. As

Venus on October 1st is about four times as far from the Earth as it was during its time of greatest brilliancy during the spring, it will not be nearly as conspicuous as it was at that time, although still much brighter than a first-magnitude star like *Regulus*.

Mars rises on September 1st about half after eleven and on October 31st at about half after nine. During the two months it moves about 31° nearly due eastward from the eastern part of *Taurus* into the eastern part of *Gemini*, and at the end of October is a little south of *Castor* and *Pollux*, the principal stars of the constellation. As the planet approaches opposition its distance from the Earth diminishes rapidly, averaging more than half a million miles daily, and on October 17th its distance from us is the same as the Earth's mean distance from the Sun. At the time of nearest approach at the end of this year the distance of the planet from the Earth will be about 60 per cent of this. During the two months the planet nearly doubles its brightness, and just before the end of October will be about one half as bright as it will be at opposition.

Jupiter is a fine evening object in the southwestern sky. On September 1st it sets shortly after midnight, and on October 31st a little before 9 P. M. At the beginning of September it is moving slowly westward, but becomes stationary and then begins to move eastward on September 4th, the entire eastward motion up to the end of October being about 5° . It will then occupy almost exactly the same position it held among the stars early in July, in *Sagittarius*, a little north of the eastern end of the "milk dipper."

Saturn rises shortly after eleven in the evening on September 1st, and shortly after seven on October 31st. It is in the constellation *Taurus* east and north of the principal star *Aldebaran*, and up to September 30th moves about 3° eastward. It then begins westward, or retrograde, motion and moves about 1° in that direction during October. On October 1st it is 10° east and 5° north of *Aldebaran* and approaches the star during the month. This approach will continue until about the end of January, 1914, when the distance will be diminished to about one half that of October 1st.

Uranus is above the horizon until half after two in the morning on September 1st and until about half after ten in the evening on October 31st. It is in the constellation *Capricorn* and moves slowly westward less than 1° up to October 13th. It then begins to move eastward, but the motion is small. It remains near the fifth magnitude star ν *Capricorni*, but it is not at all easy to identify. The planet on October 1st is about 3° west and $1^{\circ} 30'$ south of the star.

Neptune rises at a little after 2 A. M. on September 1st and shortly after 10 P. M. on October 31st. It is in the extreme eastern part of the constellation *Gemini*.